

Seeing the forest for the trees

The role of woodlots in Ontario environmental strategies

Warren Mabee

31st Kemptville Winter Woodlot Conference

21 February 2018

Forest loss

Southern Ontario has lost 9.7 million ha of forest over the years

(Suffling et al. 2003. Forestry Chronicle 79(3))

We have approximately 2.6 million ha of forest cover left in Southern Ontario; only a fraction (260,000 ha) is old-growth, and 87% of it is privately owned- much of it in forest 'islands' or woodlots

Forest loss impacts – Eastern Ontario

Species that like dense forests have moved north and decreased

- grey wolf (*Canis lupus*), eastern cougar (*Puma concolor cougar*), and wolverine (*Gulo gulo*)

Species that prefer edge and open habitats have increased

- white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*)



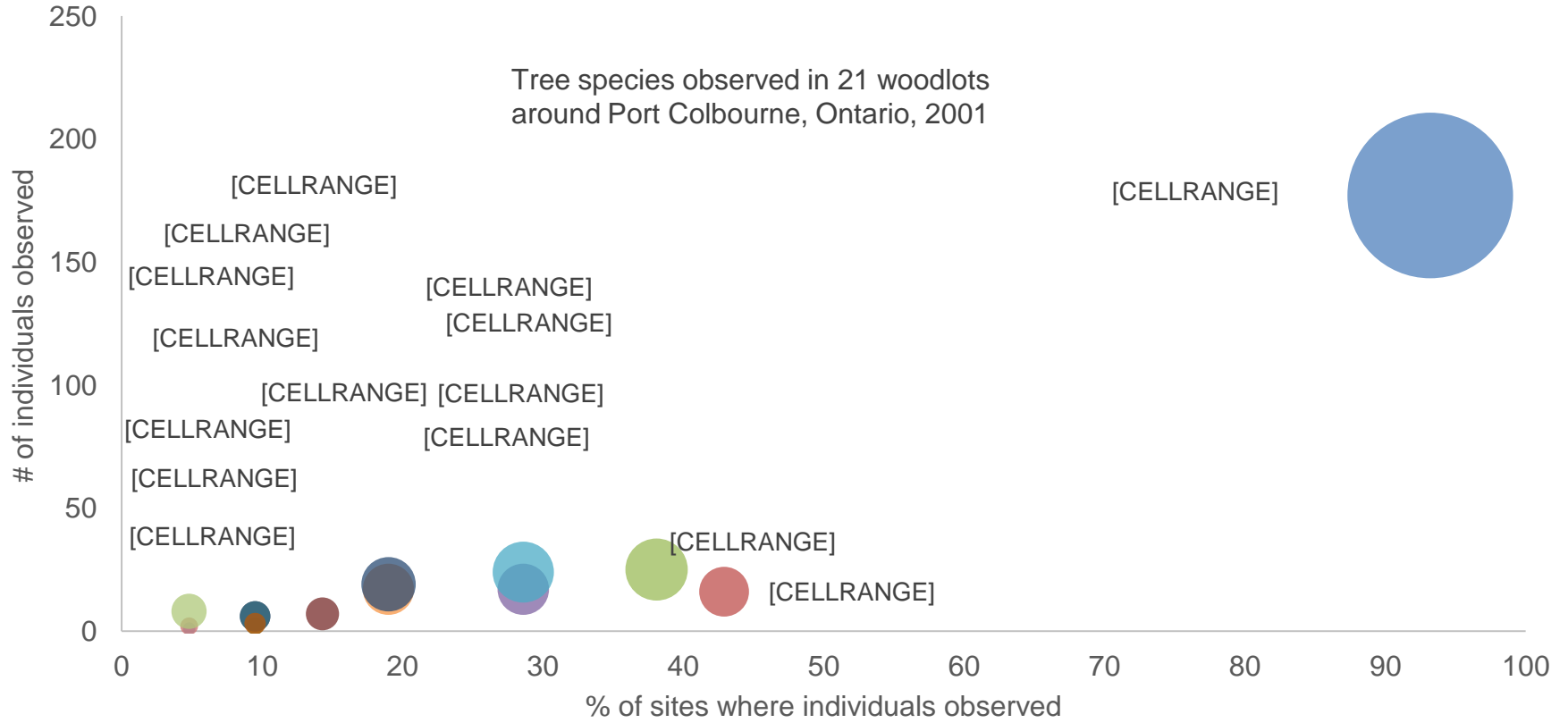
Typical farm – southern Ontario



Woodlots



Biodiversity – trees



Biodiversity – trees (Eastern Ontario)

In 22 sugar bushes, species observed include:

- Maple (sugar, black, silver, red, striped)
- Oak (red, white)
- Ash (black, white)
- Other hardwood: Hickory, Butternut, Black walnut, Elm, American beech, Black cherry, Basswood, Ironwood, Tulip tree, Poplar
- Pine (Scots, Jack, eastern white, red)
- Spruce (red, white)
- Other conifers: Eastern white cedar, Balsam fir, Eastern hemlock, Tamarack

General management principles

Create a management plan for your woodlot

Monitor biodiversity on your property

Maintain a contiguous forest of at least 40 hectares to provide adequate habitat

Work with neighbouring landowners to reconnect fragmented habitats and to improve edge habitats between properties

Maintain a diversity of habitats

Work with contractors who understand the importance of protecting wildlife

Consult professional foresters or wildlife biologists to maintain critical habitats for wildlife

Avoid handling or touching wildlife, eggs, or nests

Protect animal movement corridors

What are operators doing?

From 22 woodlot operators:	Implemented	Partial	Not implemented
Management plan	3 (14%)	19 (86%)	
Monitor biodiversity		16 (73%)	6 (27%)
40 hectare woodlot	11 (50%)		11 (50%)
Reconnecting fragments	1 (5%)	8 (36%)	13 (59%)
Habitat diversity	10 (45%)		12 (55%)
Skilled contractors			22 (100%)
Consult experts	4 (18%)	18 (82%)	
Don't handle wildlife		22 (100%)	
Protect corridors			22 (100%)

Specific management principles

Remove or narrow trails and roadsides; roads <2% of the stand

Avoid vehicle use in the woodlot; restrict ATVs and snowmobiles from sensitive areas

Keep livestock out of woodlands to reduce disturbance

Protect habitats of rare species

Remove alien invasive plant species

Retain individuals of all tree species

Retain at least 10 conifers per hectare

Plant native species of trees and shrubs that are appropriate for site conditions

Leave brush piles as habitat for small animals

Retain rotting stumps, logs, downed trees, limbs as habitat

Create habitat for herpetiles by putting boards over wet leaves and letting them rot

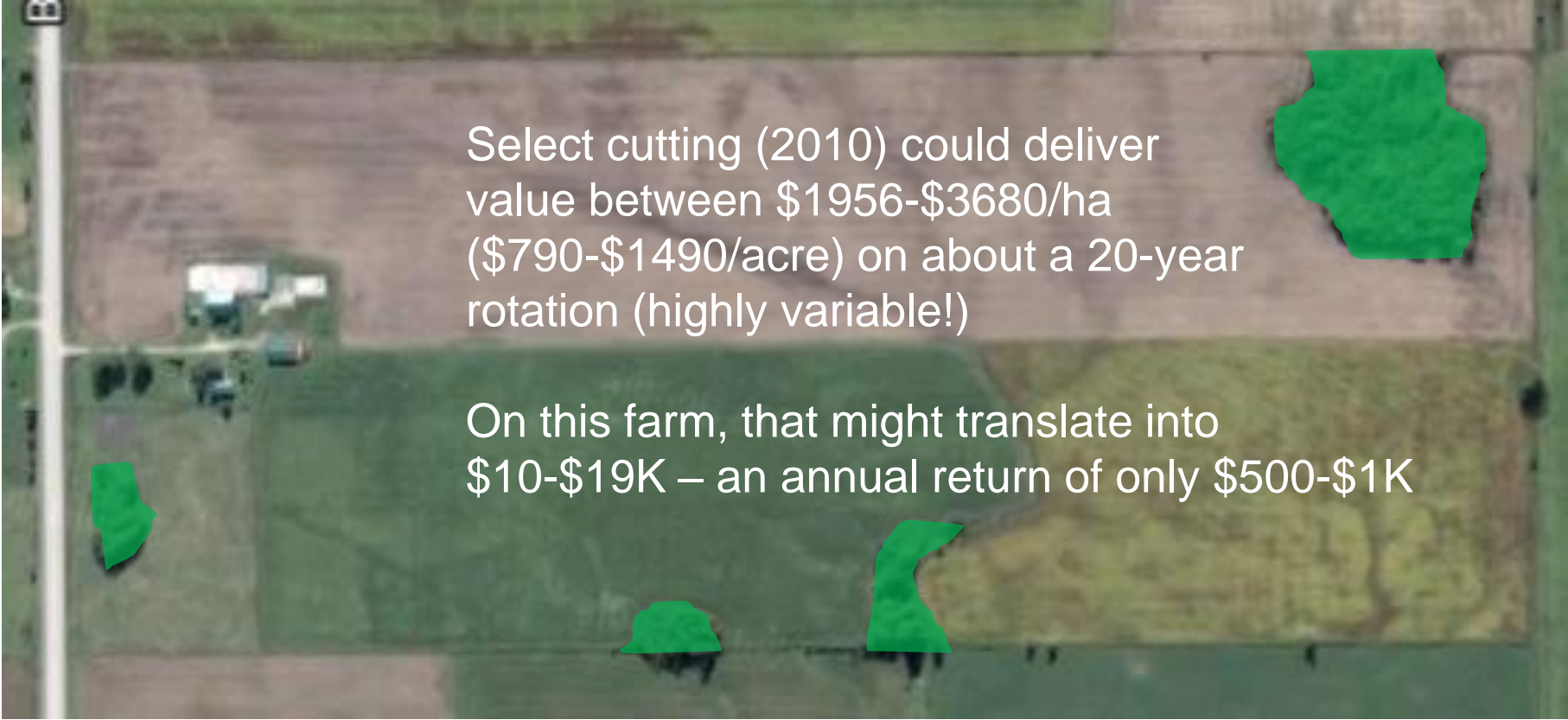
What are operators doing?

From 22 woodlot operators:	Implemented	Partial	Disagree	Not implemented
Roads <2% of land	1 (5%)	21 (95%)		
Avoid vehicle use	5 (23%)	17 (77%)		
Keep livestock out	8 (36%)		2 (9%)	12 (55%)
Protect habitats		2 (9%)		20 (91%)
Remove invasive species		5 (23%)	2 (9%)	15 (68%)
Retain all tree species	7 (32%)	13 (59%)	2 (9%)	
Retain 10 conifers per ha		22 (100%)		
Plant appropriate trees	4 (18%)			18 (82%)
Leave brush	14 (64%)		8 (36%)	
Retain debris	7 (32%)	14 (64%)	1 (5%)	
Create herpetile habitat				22 (100%)

Impacts of partial harvests on bird populations

- Forest-interior habitat is in short supply
- Impacts on bird habitats can be minimized by following good forest management practices (as proscribed by OMNR)
- Heavy cutting may increase numbers of generalist species and nest predators like blue jays

Timber value



Select cutting (2010) could deliver value between \$1956-\$3680/ha (\$790-\$1490/acre) on about a 20-year rotation (highly variable!)

On this farm, that might translate into \$10-\$19K – an annual return of only \$500-\$1K

Carbon value



Annual growth rates – 1-3 t/ha/year

At \$20/t, this farm might net \$260 per year in additional carbon sequestered; at \$50/t, this rises to \$650 per year

Carbon loss

Ontario's forests have an average density of approximately 87 t/ha, but this may have been 1.5 or 2x higher in old-growth deciduous landscapes

(Penner et al. 1997. NRCan Information Report BC-X-370)

Every tonne of wood represents about 1.7 tonnes of CO₂

Forest area loss thus has led to approximately 2.2-2.9 Bt/CO₂, or 3-4 year's worth of Canada's current emissions

Environmental services

What are environmental services?

- Provisioning services – physical products
Includes forest products, bioenergy, etc.
- Cultural services – any socio-economic interaction
Includes tourism, indigenous interaction, etc.
- Regulating services – actions within the environment
Covers all aspects of forests as a component in the global ecosystem
- Support services – Nutrient cycling, production, soil formation, etc...
Focus on functions required to maintain the forest ecosystem

Protected areas

	Forest (M ha)	Forest (% of land area)	Primary forest (% of forest area)	Forest within protected areas (% of forest area)
Finland	22.2	73.1%	1.0%	17.7%
Sweden	28.1	68.4%	8.6%	7.1%
Canada	347.1	38.2%	59.3%	6.9%*
Norway	12.1	39.8%	1.3%	4.8%
Russia	814.9	49.8%	33.5%	2.2%

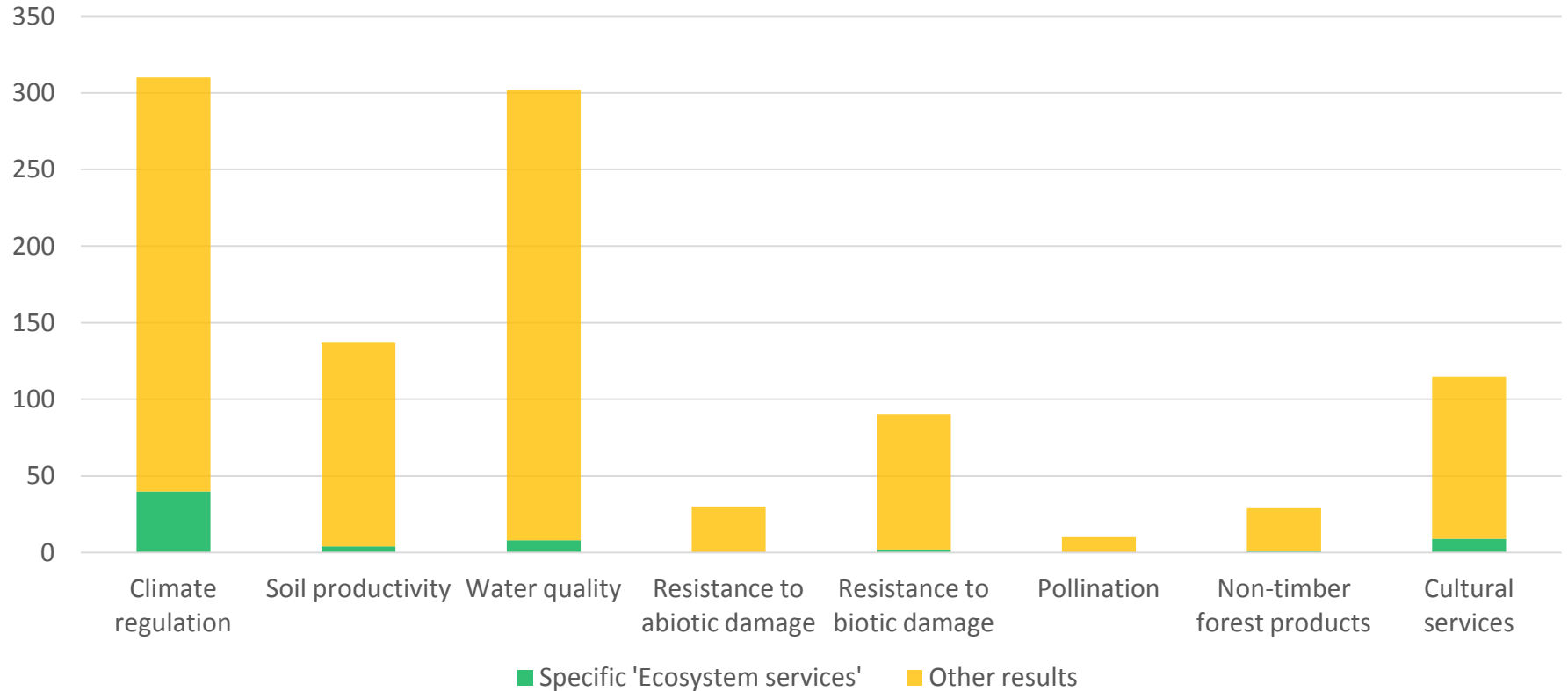
*Compare this to the total protected area: 10.5% (1.05M km²) of Canada's land/freshwater

Ontario's protected area network

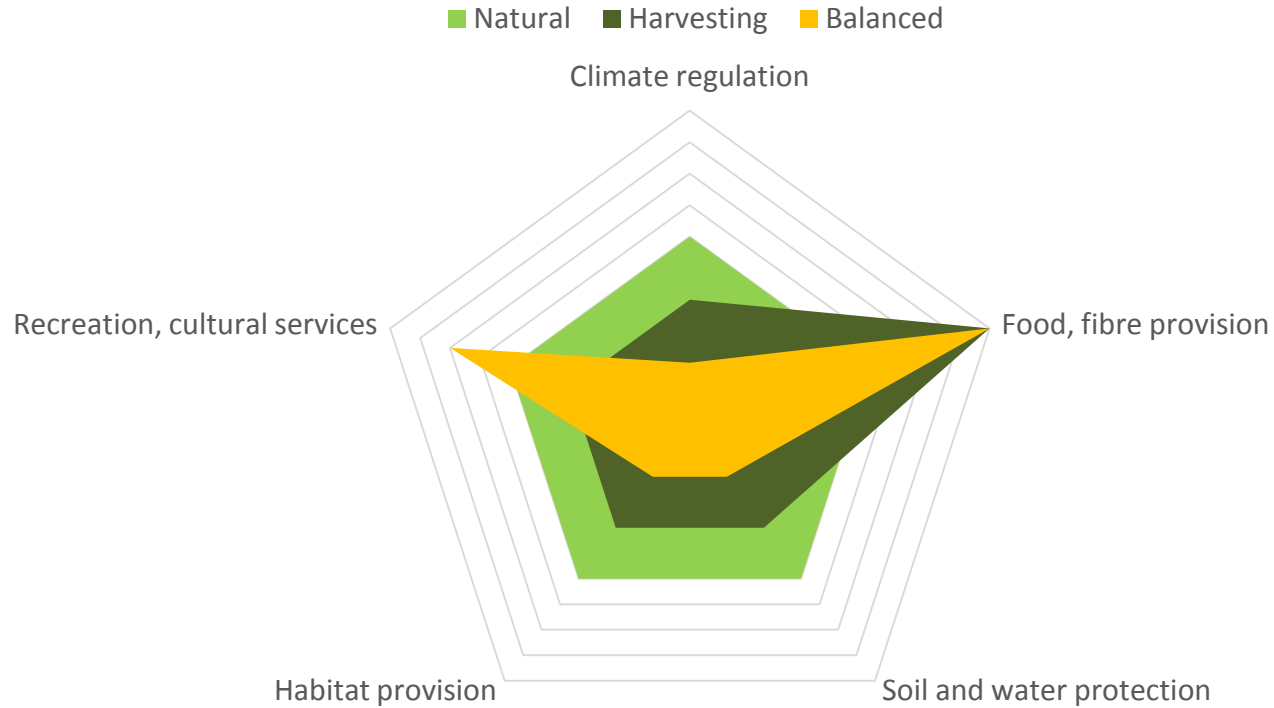


You will note that
Southern Ontario is
highly
underrepresented!

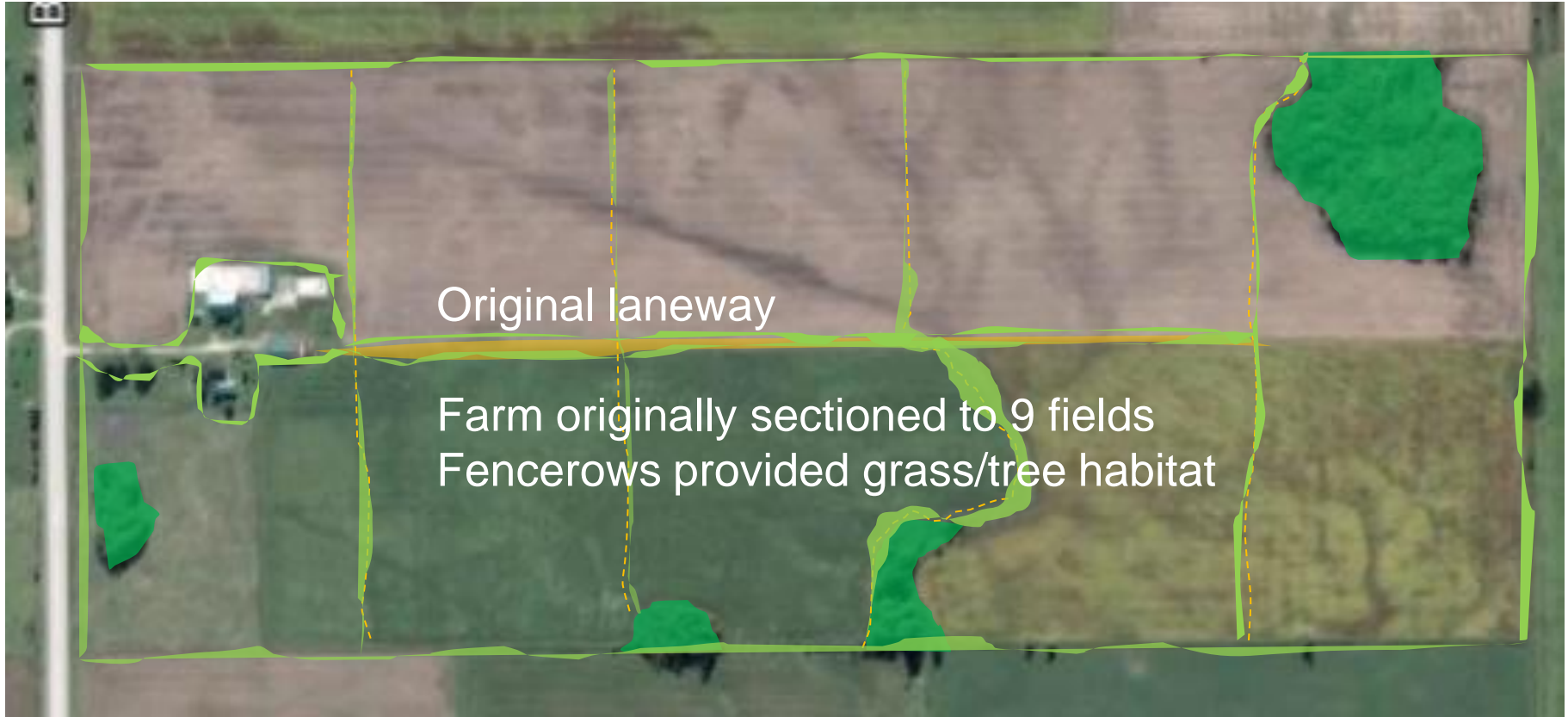
Literature on boreal ecosystem services



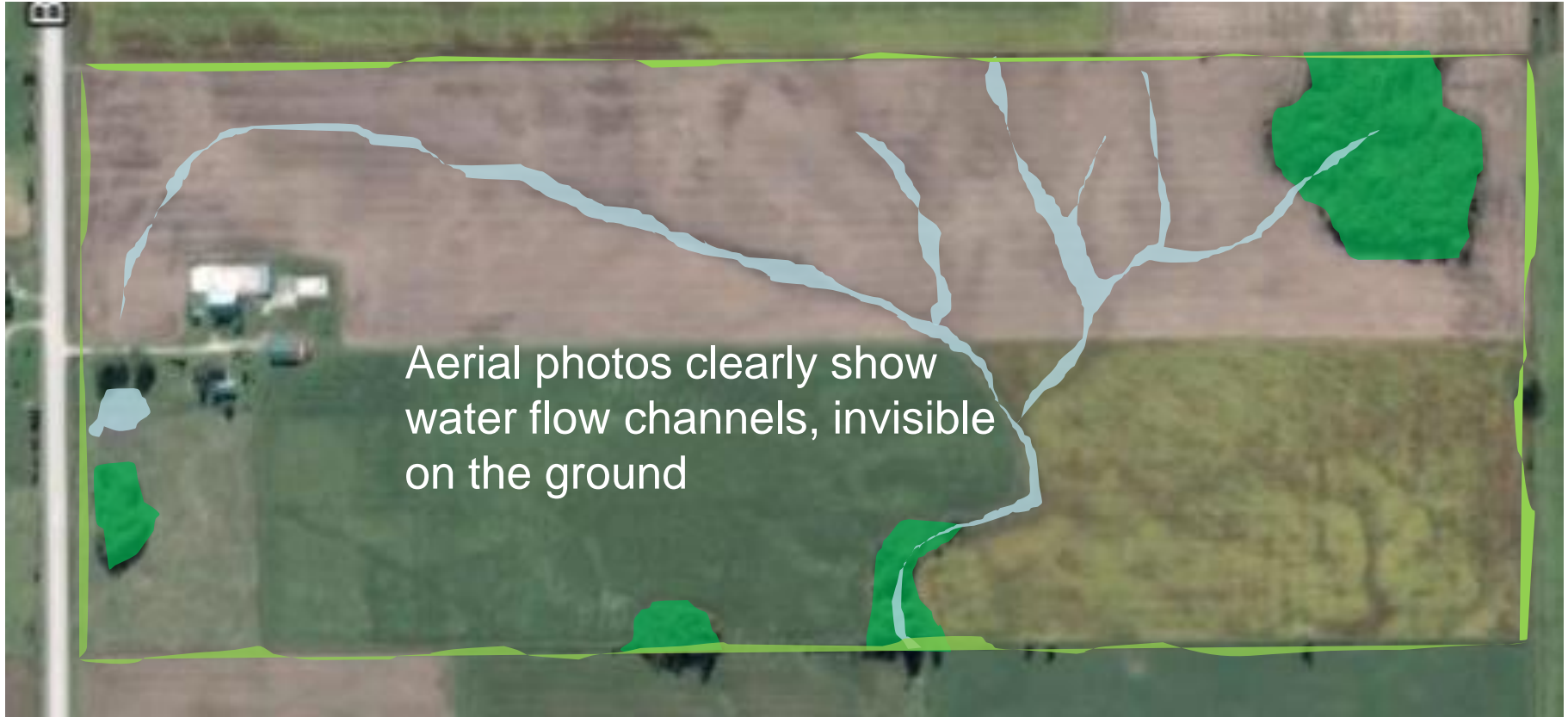
What happens when you maximize uses?



Connectivity

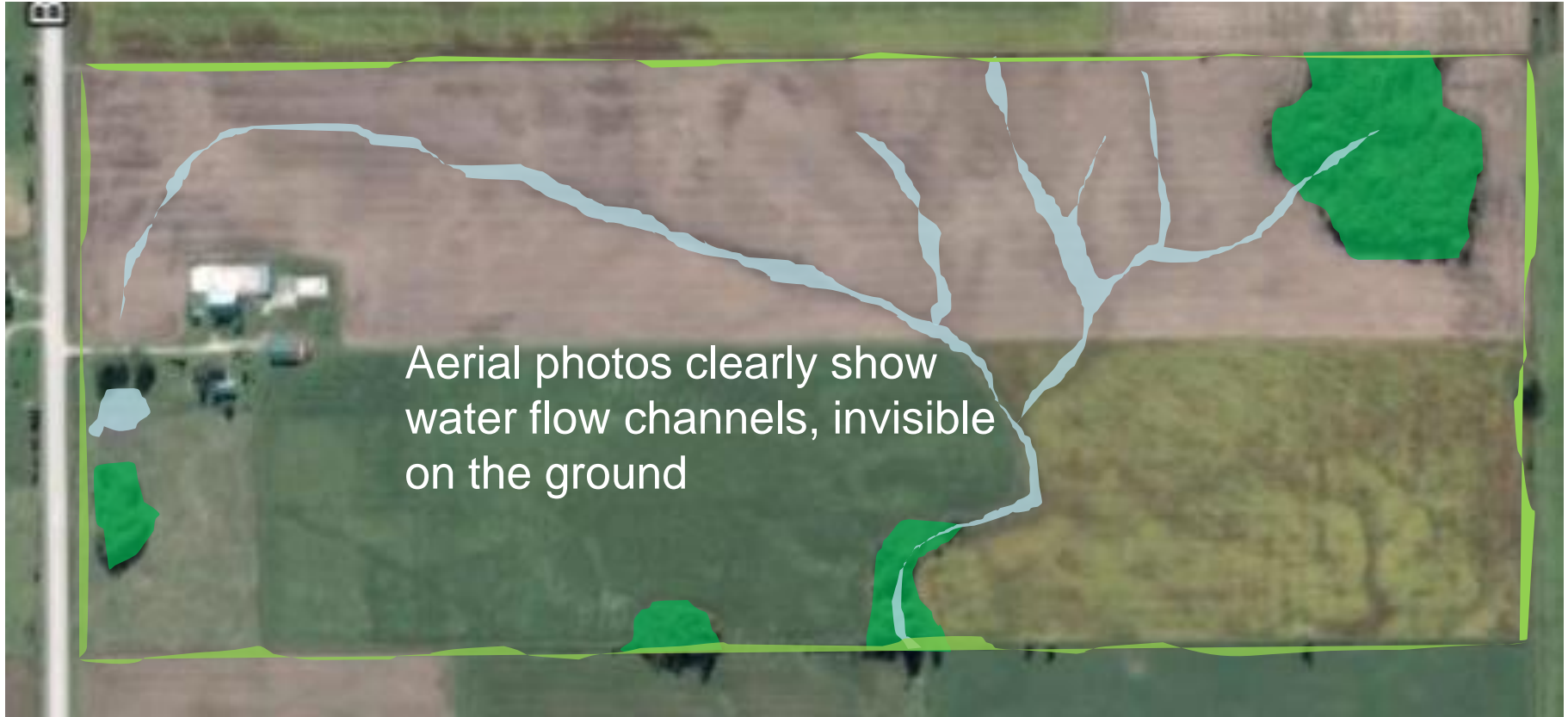


Surface water



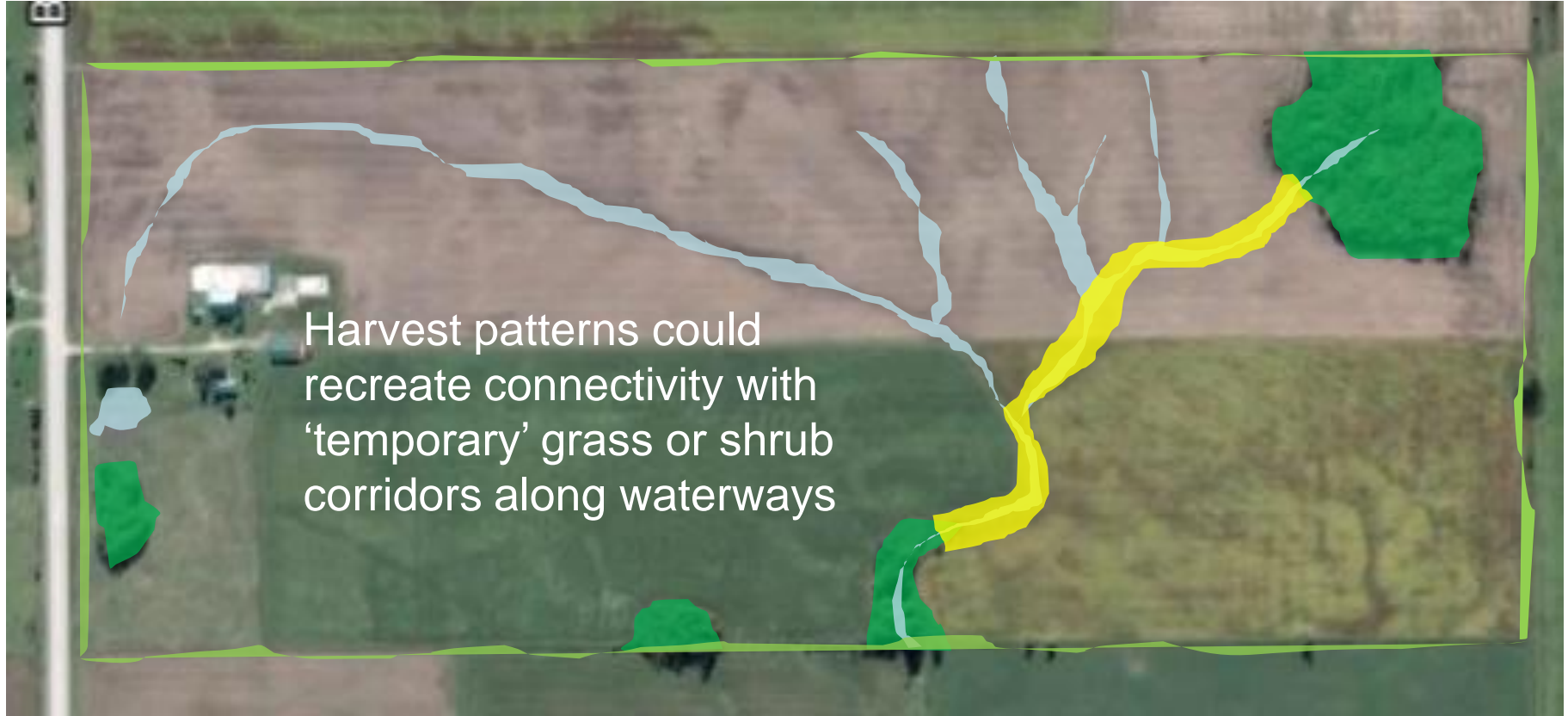
Aerial photos clearly show
water flow channels, invisible
on the ground

Surface water

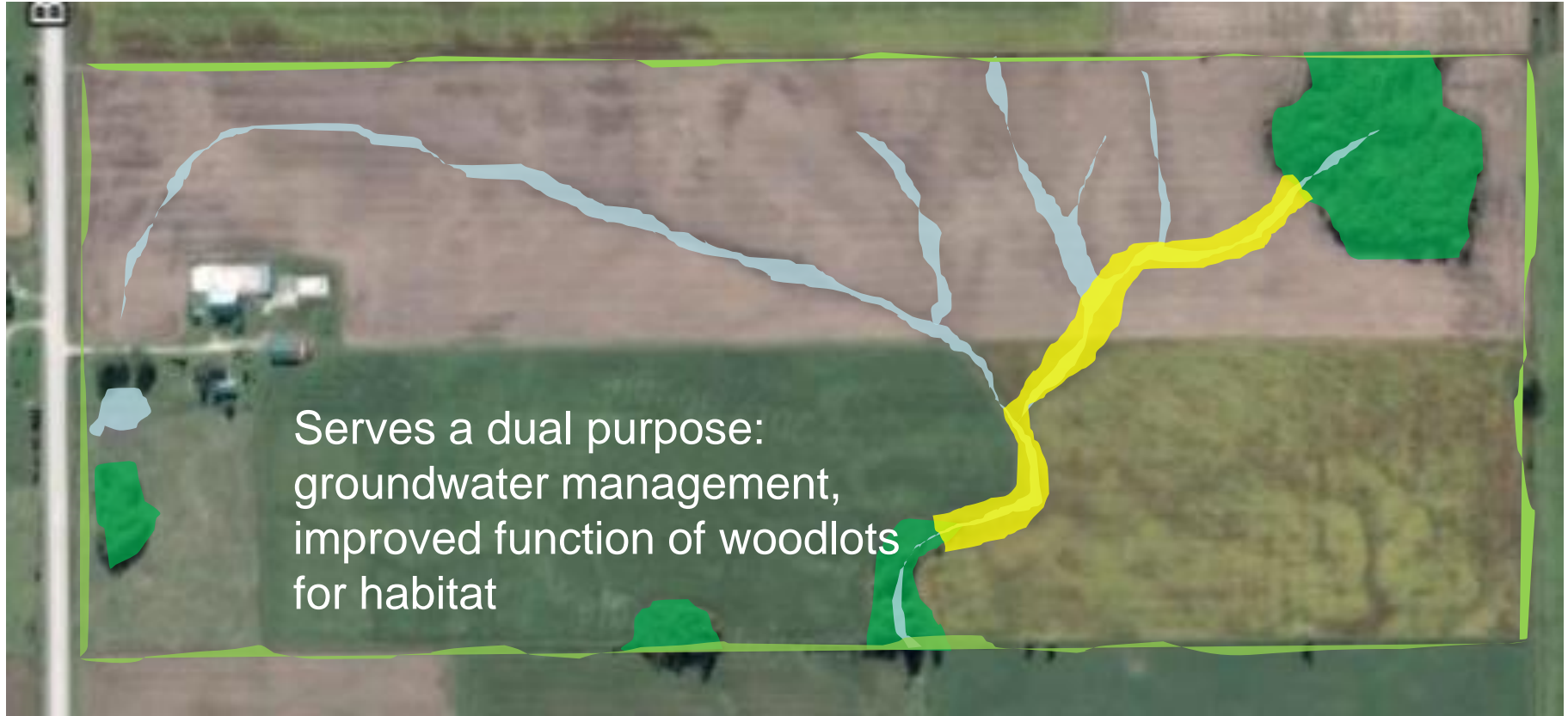


Aerial photos clearly show
water flow channels, invisible
on the ground

New connectivity

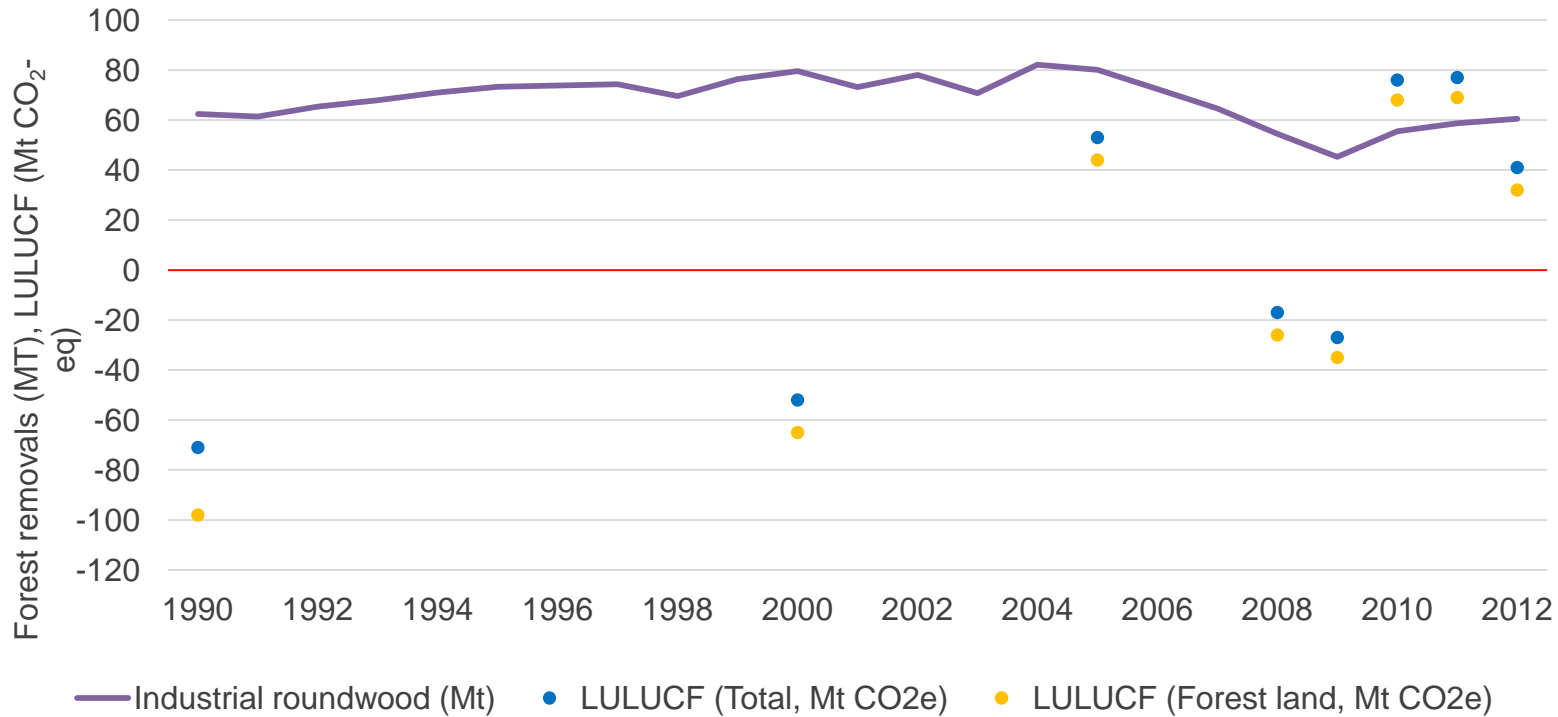


New connectivity



Serves a dual purpose:
groundwater management,
improved function of woodlots
for habitat

Forest harvest and LULUCF



REDD

Reducing emissions from deforestation and degradation

Incentives actions that can lower CO₂ emissions by preventing forest loss or degradation - carbon trading, offsets, paying for forest management

No internationally-recognized formal mechanism for REDD

Voluntary REDD projects in many places

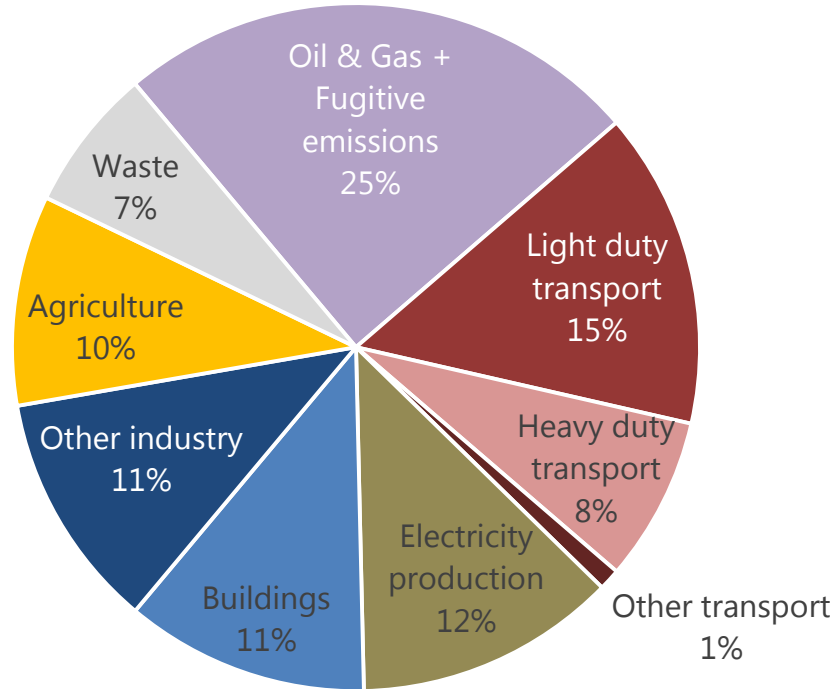
Canada's focus – better understanding of carbon in wood products

Canada sees 'natural' forest emissions as outside of the mandate

Forest carbon in wood products

	Lumber	Panel products	Paper	Energy
Half-life	35 years	25 years	2 years	0 years
Proportion (from 1m ³ harvested)	32.6%	9.7%	36.2%	21.5%
After drying (from 1m ³ harvested)	32.6%	9.7%	36.2%	10.7-15.5%
Carbon	0.225 t/m ³	0.295 t/m ³	0.45 t/t pulp	0.196 t/m ³

Total emissions (2013): 726 Mt CO₂-e



Key takeaways

After today, you should know:

- The role that forests play relative to Canada's emissions
- The emission pools that forest products can best help us to address (housing, transport)
- The scale of this impact – biomass is likely to account for as much as 400-450 Mt/a of Canada's GHG emission reductions, and forests will be a large part of this